



SEQUENCE LISTING

<110> Wang Ph.D., Chang Yi

<120> PEPTIDE COMPOSITION AS IMMUNOGEN FOR THE TREATMENT OF  
ALLERGY

<130> 11514153US1

<140> 09/701,623

<141> 2000-12-01

<150> PCT/US99/13959

<151> 1999-06-21

<150> 09/100,287

<151> 1998-06-20

<160> 91

<170> PatentIn Ver. 2.1

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<213> HUMAN

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<301> Dorrington,  
Bennich,

<303> Immunology

<304> 41

<306> 3-25

<307> 1978

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Val Cys Ser Arg Asp Phe Thr Pro Pro Thr Val Lys Ile Leu Gln Ser  
1 5 10 15

Ser Cys Asp Gly Gly Gly His Phe Pro Pro Thr Ile Gln Leu Leu Cys  
20 25 30

Leu Val Ser Gly Tyr Thr Pro Gly Thr Ile Asn Ile Thr Trp Leu Glu  
35 40 45

00701623-120100

Asp	Gly	Gln	Val	Met	Asp	Val	Asp	Leu	Ser	Thr	Ala	Ser	Thr	Thr	Gln	50	55	60	
Glu	Gly	Glu	Leu	Ala	Ser	Thr	Gln	Ser	Glu	Leu	Thr	Leu	Ser	Gln	Lys	65	70	75	80
His	Trp	Leu	Ser	Asp	Arg	Thr	Tyr	Thr	Cys	Gln	Val	Thr	Tyr	Gln	Gly	85	90	95	
His	Thr	Phe	Glu	Asp	Ser	Thr	Lys	Lys	Cys	Ala	Asp	Ser	Asn	Pro	Arg	100	105	110	
Gly	Val	Ser	Ala	Tyr	Leu	Ser	Arg	Pro	Ser	Pro	Phe	Asp	Leu	Phe	Ile	115	120	125	
Arg	Lys	Ser	Pro	Thr	Ile	Thr	Cys	Leu	Val	Val	Asp	Leu	Ala	Pro	Ser	130	135	140	
Lys	Gly	Thr	Val	Asn	Leu	Thr	Trp	Ser	Arg	Ala	Ser	Gly	Lys	Pro	Val	145	150	155	160
Asn	His	Ser	Thr	Arg	Lys	Glu	Glu	Lys	Gln	Arg	Asn	Gly	Thr	Leu	Thr	165	170	175	
Val	Thr	Ser	Thr	Leu	Pro	Val	Gly	Thr	Arg	Asp	Trp	Ile	Glu	Gly	Glu	180	185	190	
Thr	Tyr	Gln	Cys	Arg	Val	Thr	His	Pro	His	Leu	Pro	Arg	Ala	Leu	Met	195	200	205	
Arg	Ser	Thr	Thr	Lys	Thr	Ser	Gly	Pro	Arg	Ala	Ala	Pro	Glu	Val	Tyr	210	215	220	
Ala	Phe	Ala	Thr	Pro	Glu	Trp	Pro	Gly	Ser	Arg	Asp	Lys	Arg	Thr	Leu	225	230	235	240
Ala	Cys	Leu	Ile	Gln	Asn	Phe	Met	Pro	Glu	Asp	Ile	Ser	Val	Gln	Trp	245	250	255	
Leu	His	Asn	Glu	Val	Gln	Leu	Pro	Asp	Ala	Arg	His	Ser	Thr	Thr	Gln	260	265	270	
Pro	Arg	Lys	Thr	Lys	Gly	Ser	Gly	Phe	Phe	Val	Phe	Ser	Arg	Leu	Glu	275	280	285	
Val	Thr	Arg	Ala	Glu	Trp	Gln	Glu	Lys	Asp	Glu	Phe	Ile	Cys	Arg	Ala	290	295	300	

00701623-120100

Val His Glu Ala Ala Ser Pro Ser Gln Thr Val Gln Arg Ala Val Ser  
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Val Asn Pro Gly Lys  
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 <301> Patel,  
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 <304> 41  
 <306> 282-286  
 <307> 1995

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 Ala Cys Ala Leu Asn Phe Ile Pro Pro Thr Val Lys Leu Phe His Ser  
 1 5 10 15

Ser Cys Asn Pro Val Gly Asp Thr His Thr Thr Ile Gln Leu Leu Cys  
 20 25 30

Leu Ile Ser Gly Tyr Val Pro Gly Asp Met Glu Val Ile Trp Leu Val  
 35 40 45

Asp Gly Gln Lys Ala Thr Asn Ile Phe Pro Tyr Thr Ala Pro Gly Thr  
 50 55 60

Lys Glu Gly Asn Val Thr Ser Thr His Ser Glu Leu Asn Ile Thr Gln  
 65 70 75 80

Gly Glu Trp Val Ser Gln Lys Thr Tyr Thr Cys Gln Gly Phe Thr Phe  
 85 90 95

Lys Asp Glu Ala Arg Lys Cys Ser Glu Ser Asp Pro Arg Gly Val Thr  
 100 105 110

Ser Tyr Leu Ser Pro Pro Ser Pro Leu Asp Leu Tyr Val His Lys Ala  
 115 120 125

Pro Lys Ile Thr Cys Leu Val Val Asp Leu Ala Thr Met Glu Gly Met

130                      135                      140  
 Asn Leu Thr Trp Tyr Arg Glu Ser Lys Glu Pro Val Asn Pro Gly Pro  
 145                      150                      155                      160  
 Leu Asn Lys Lys Asp His Phe Asn Gly Thr Ile Thr Val Thr Ser Thr  
                     165                      170                      175  
 Leu Pro Val Asn Thr Asn Asp Trp Ile Glu Gly Glu Thr Tyr Tyr Cys  
                     180                      185                      190  
 Arg Val Thr His Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala  
                     195                      200                      205  
 Lys Ala Pro Gly Lys Arg Ala Pro Pro Asp Val Tyr Leu Phe Leu Pro  
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 Pro Glu Glu Glu Gln Gly Thr Lys Asp Arg Val Thr Leu Thr Cys Leu  
 225                      230                      235                      240  
 Ile Gln Asn Phe Phe Pro Ala Asp Ile Ser Val Gln Trp Leu Arg Asn  
                     245                      250                      255  
 Asp Ser Pro Ile Gln Thr Asp Gln Tyr Thr Thr Thr Gly Pro His Lys  
                     260                      265                      270  
 Val Ser Gly Ser Arg Pro Ala Phe Phe Ile Phe Ser Arg Leu Glu Val  
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 Ser Arg Val Asp Trp Glu Gln Lys Asn Lys Phe Thr Cys Gln Val Val  
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<301> Dorrington,

Bennich,

<303> Immunology

<304> 41  
 <306> 3-25  
 <307> 1978

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 <304> 41  
 <306> 282-286  
 <307> 1995

<300>  
 <301> Steen,  
 <303> J. Mol. Biol.  
 <304> 177  
 <306> 19-32  
 <307> 1984

<300>  
 <301> Ishida,  
 <303> EMBO J.  
 <304> 1  
 <306> 1117-1123  
 <307> 1982

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 Ala Arg Pro Val Asn Ile Thr Lys Pro Thr Val Asp Leu Leu His Ser  
 1 5 10 15

Ser Cys Asp Pro Asn Ala Phe His Ser Thr Ile Gln Leu Tyr Cys Phe  
 20 25 30

Val Tyr Gly His Ile Gln Asn Asp Val Ser Ile His Trp Leu Met Asp  
 35 40 45

Asp Arg Lys Ile Tyr Asp Thr His Ala Gln Asn Val Leu Ile Lys Glu  
 50 55 60

Glu Gly Lys Leu Ala Ser Thr Tyr Ser Arg Leu Asn Ile Thr Gln Gln  
 65 70 75 80

Gln Trp Met Ser Glu Ser Thr Phe Thr Cys Lys Val Thr Ser Gln Gly  
 85 90 95

Glu Asn Tyr Trp Ala His Thr Arg Arg Cys Ser Asp Asp Glu Pro Arg  
 100 105 110

Gly Val Ile Thr Tyr Leu Ile Pro Pro Ser Pro Leu Asp Leu Tyr Glu

09701623-120100

115		120		125
Asn Gly Thr Pro Lys Leu Thr Cys Leu Val Leu Asp Leu Glu Ser Glu				
130		135		140
Glu Asn Ile Thr Val Thr Trp Val Arg Glu Arg Lys Lys Ser Ile Gly				
145		150		155
				160
Ser Ala Ser Gln Arg Ser Thr Lys His His Asn Ala Thr Thr Ser Ile				
	165		170	175
Thr Ser Ile Leu Pro Val Asp Ala Lys Asp Trp Ile Glu Gly Glu Gly				
	180		185	190
Tyr Gln Cys Arg Val Asp His Pro His Phe Pro Lys Pro Ile Val Arg				
	195		200	205
Ser Ile Thr Lys Ala Leu Gly Leu Arg Ser Ala Pro Glu Val Tyr Val				
	210		215	220
Phe Leu Pro Pro Glu Glu Glu Glu Lys Asn Lys Arg Thr Leu Thr Cys				
	225		230	235
				240
Leu Ile Gln Asn Phe Phe Pro Glu Asp Ile Ser Val Gln Trp Leu Gln				
	245		250	255
Asp Ser Lys Leu Ile Pro Lys Ser Gln His Ser Thr Thr Thr Pro Leu				
	260		265	270
Lys Thr Asn Gly Ser Asn Gln Arg Phe Phe Ile Phe Ser Arg Leu Glu				
	275		280	285
Val Thr Lys Ala Leu Trp Thr Gln Thr Lys Gln Phe Thr Cys Arg Val				
	290		295	300
Ile His Glu Ala Leu Arg Glu Pro Arg				
305		310		

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His	Arg	Cys	Asp	Pro	Asn	Ala	Phe	His	Ser	Thr	Ile	Gln	Leu	Tyr	Cys	20	25	30	
Phe	Ile	Tyr	Gly	His	Ile	Leu	Asn	Asp	Val	Ser	Val	Ser	Trp	Leu	Met	35	40	45	
Asp	Asp	Arg	Glu	Ile	Thr	Asp	Thr	Leu	Ala	Gln	Thr	Val	Leu	Ile	Lys	50	55	60	
Glu	Glu	Gly	Lys	Leu	Ala	Ser	Thr	Cys	Ser	Lys	Leu	Asn	Ile	Thr	Glu	65	70	75	80
Gln	Gln	Trp	Met	Ser	Glu	Ser	Thr	Phe	Thr	Cys	Arg	Val	Thr	Ser	Gln	85	90	95	
Gly	Cys	Asp	Tyr	Leu	Ala	His	Thr	Arg	Arg	Cys	Pro	Asp	His	Glu	Pro	100	105	110	
Arg	Gly	Ala	Ile	Thr	Tyr	Leu	Ile	Pro	Pro	Ser	Pro	Leu	Asp	Leu	Tyr	115	120	125	
Gln	Asn	Gly	Ala	Pro	Lys	Leu	Thr	Cys	Leu	Val	Val	Asp	Leu	Glu	Ser	130	135	140	
Glu	Lys	Asn	Val	Asn	Val	Thr	Trp	Asn	Gln	Glu	Lys	Lys	Thr	Ser	Val	145	150	155	160
Ser	Ala	Ser	Gln	Trp	Tyr	Thr	Lys	His	His	Asn	Asn	Ala	Thr	Thr	Ser	165	170	175	
Ile	Thr	Ser	Ile	Leu	Pro	Val	Val	Ala	Lys	Asp	Trp	Ile	Glu	Gly	Tyr	180	185	190	
Gly	Tyr	Gln	Cys	Ile	Val	Asp	Arg	Pro	Asp	Phe	Pro	Lys	Pro	Ile	Val	195	200	205	
Arg	Ser	Ile	Thr	Lys	Thr	Pro	Gly	Gln	Arg	Ser	Ala	Pro	Glu	Val	Tyr	210	215	220	
Val	Phe	Pro	Pro	Pro	Glu	Glu	Glu	Ser	Glu	Asp	Lys	Arg	Thr	Leu	Thr	225	230	235	240
Cys	Leu	Ile	Gln	Asn	Phe	Phe	Pro	Glu	Asp	Ile	Ser	Val	Gln	Trp	Leu	245	250	255	

Gly Asp Gly Lys Leu Ile Ser Asn Ser Gln His Ser Thr Thr Thr Pro  
260 265 270

Leu Lys Ser Asn Gly Asn Gln Gly Phe Phe Ile Phe Ser Arg Leu Glu  
275 280 285

Val	Ala	Lys	Thr	Leu	Trp	Thr	Gln	Arg	Lys	Gln	Phe	Thr	Cys	Gln	Val
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Ile His Glu Ala Leu Gln Lys Pro Arg  
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Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg  
1 5 10 15

Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro His Leu Pro Lys  
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Asp Ile Val Arg Ser Ile Ala Lys Cys  
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&lt;212&gt; PRT



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Cys Gly Glu Gly Tyr Gln Ser Arg Val Asp His Pro His Phe Pro Lys  
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Pro Ile Val Arg Ser Ile Thr Lys Cys  
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Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp Arg Pro Asp Phe Pro Lys  
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Pro Ile Val Arg Ser Ile Thr Leu Cys  
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Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
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Ile Asp

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09701623-120100

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Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa

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5

10

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Xaa Leu Phe

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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu  
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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Tyr Gln Phe  
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 Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
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 Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro  
 20 25 30  
 His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
 35 40 45

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 Gly Gly Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile  
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 Thr Thr Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr  
 35 40 45  
 His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
 50 55 60

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Pro Pro Xaa Pro Xaa Pro  
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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Lys Lys  
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Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr Ile Asp  
20 25 30

Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu  
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Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa  
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Ile Leu Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His  
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Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
35 40 45

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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Gln Phe Gly  
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Gly Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu  
20 25 30  
Xaa Ile Leu Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr  
35 40 45  
His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
50 55 60

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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Ile Ser  
1 5 10 15

Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa Ile Leu  
20 25 30

Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His  
35 40 45

Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa Gly

1

5

10

15

Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro

20

25

30

Arg Ala Leu Met Arg Ser Thr Thr Lys Cys

35

40

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Gly Gly Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa  
20 25 30

Xaa Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His  
35 40 45

Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
50 55 60

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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Xaa Xaa  
1 5 10 15

Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa Gly Gly Cys  
20 25 30

Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg Ala  
 35 40 45

Leu Met Arg Ser Thr Thr Lys Cys  
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 <223> K, R

<220>  
 <221> MOD\_RES  
 <222> (16)  
 <223> G, T

<400> 24  
 Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa  
 1 5 10 15

05701623-120100

Ile Leu Phe Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His  
 20 25 30

Pro Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys  
 35 40 45

<210> 25

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 25

Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
 1 5 10 15

Ile Asp Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His Pro  
 20 25 30

Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys  
 35 40 45

<210> 26

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetice

<400> 26

Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
 1 5 10 15

Ile Asp Gly Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro  
 20 25 30

His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
 35 40 45

<210> 27

<211> 46

<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<220>  
<221> MOD\_RES  
<222> (1)  
<223> I, M, L

<220>  
<221> MOD\_RES  
<222> (2)  
<223> S, T

<220>  
<221> MOD\_RES  
<222> (7)  
<223> K, L

<220>  
<221> MOD\_RES  
<222> (8)  
<223> G, R

<220>  
<221> MOD\_RES  
<222> (9)  
<223> V, T

<220>  
<221> MOD\_RES  
<222> (10)  
<223> I, V

<220>  
<221> MOD\_RES  
<222> (14)  
<223> I, T

<220>  
<221> MOD\_RES  
<222> (15)  
<223> E, R

<220>  
<221> MOD\_RES

09701623.120100



<222> (16)  
<223> G, M

<220>  
<221> MOD\_RES  
<222> (19)  
<223> F, T

<220>  
<221> MOD\_RES  
<222> (20)  
<223> G, M

<400> 27  
Xaa Xaa Ile Ser Glu Ile Xaa Gly Val Xaa Val His Lys Xaa Xaa Xaa  
1 5 10 15  
Ile Leu Xaa Xaa Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His  
20 25 30  
Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
35 40 45

<210> 28  
<211> 49  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 28  
Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
1 5 10 15  
Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu  
20 25 30  
Val Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser  
35 40 45

Arg

<210> 29  
<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 29

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn

1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu

20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala

35 40 45

Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg

50 55 60

<210> 30

<211> 64

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 30

Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys

1 5 10 15

Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser

20 25 30

Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val

35 40 45

Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg

50 55 60

<210> 31

<211> 76

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 31

Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala  
50 55 60

Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
65 70 75

<210> 32

<211> 35

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 32

Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
1 5 10 15

Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu  
20 25 30

Val Val Asp  
35

<210> 33

<211> 46

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 33

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp  
35 40 45

<210> 34

<211> 50

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 34

Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys  
1 5 10 15

Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser  
20 25 30

Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val  
35 40 45

Val Asp

50

<210> 35

<211> 62

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 35

Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
 35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp  
 50 55 60

<210> 36

<211> 29

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 36

Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
 1 5 10 15

Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile  
 20 25

<210> 37

<211> 40

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 37

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
 1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
 20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile  
 35 40

<210> 38

<211> 44

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 38

Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys  
1 5 10 15

Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser  
20 25 30

Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile  
35 40

<210> 39

<211> 56

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 39

Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile  
50 55

<210> 40

<211> 76

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetice

<400> 40

Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
 20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
 35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile Thr Cys Leu Val Val Asp Leu Ala  
 50 55 60

Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
 65 70 75

<210> 41

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 41

Cys Lys Gln Arg Asn Gly Thr Leu Thr Cys  
 1 5 10

<210> 42

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 42

Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr  
 1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
 20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro  
 35 40 45

<210> 43

<211> 34

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 43

Cys Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg Ala Ser Gly  
1 5 10 15

Lys Pro Val Asn His Ser Thr Arg Lys Glu Glu Lys Gln Arg Asn Gly  
20 25 30

Thr Cys

<210> 44

<211> 33

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 44

Cys Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys  
1 5 10 15

Arg Val Thr His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr  
20 25 30

Cys

<210> 45

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 45

Ser Thr Thr Lys Thr Ser Gly Pro Arg Ala Ala Pro Glu Val  
1 5 10



<210> 46  
<211> 14  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 46  
Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys Asn His Ser  
1 5 10

<210> 47  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 47  
Cys Ser Arg Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr  
1 5 10 15

Ile Thr Cys

<210> 48  
<211> 13  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 48  
Cys Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys  
1 5 10

<210> 49  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetice

<400> 49

Cys Pro Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys  
1 5 10 15

<210> 50

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 50

Cys Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Cys  
1 5 10 15

<210> 51

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 51

Lys Glu Glu Lys Gln Arg Asn Gly  
1 5

<210> 52

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 52

Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys  
1 5 10

<210> 53

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 53

Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr

1 5 10 15

Val Asn Leu Thr Cys

20

<210> 54

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 54

Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr

1 5 10 15

<210> 55

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 55

Thr Ser Thr Leu Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr

1 5 10 15

Tyr Gln Cys Arg Val Thr His Pro His

20 25

<210> 56

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 56

Pro Thr Ile Thr Ser Leu Val Leu Cys Leu Ala Pro Ser Lys Gly Cys  
1 5 10 15

<210> 57

<211> 23

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 57

Cys Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His  
1 5 10 15

Ser Thr Arg Lys Glu Glu Cys  
20

<210> 58

<211> 53

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 58

Cys Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His Ser Thr Arg  
1 5 10 15

Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Thr Leu  
20 25 30

Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys Arg  
35 40 45

Val Thr His Pro His  
50

<210> 59

<211> 10

<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: synthetic

<400> 59  
Lys Thr Lys Gly Ser Gly Phe Phe Val Phe  
1 5 10

<210> 60  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<220>  
<221> MOD\_RES  
<222> (4)  
<223> S, T

<220>  
<221> MOD\_RES  
<222> (7)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (8)  
<223> G, T

<220>  
<221> MOD\_RES  
<222> (12)  
<223> H, T

<220>  
<221> MOD\_RES  
<222> (13)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (16)  
<223> G, T

09701623.120100

<400> 60  
 Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa  
 1 5 10 15

Ile Leu Phe

<210> 61  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 61  
 Leu Ser Glu Ile Lys Gly Val Ile Val His Arg Leu Glu Gly Val  
 1 5 10 15

<210> 62  
 <211> 20  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 62  
 Gly Ile Leu Glu Ser Arg Gly Ile Lys Ala Arg Ile Thr His Val Asp  
 1 5 10 15

Thr Glu Ser Tyr  
 20

<210> 63  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 63  
 Lys Lys Gln Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu

1                      5                      10                      15

Leu

<210> 64  
 <211> 22  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 64  
 Lys Lys Phe Asn Asn Phe Thr Val Ser Phe Trp Leu Arg Val Pro Lys  
     1                      5                      10                      15

Val Ser Ala Ser His Leu  
                     20

<210> 65  
 <211> 30  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 65  
 Lys Lys Leu Arg Arg Leu Leu Tyr Met Ile Tyr Met Ser Gly Leu Ala  
     1                      5                      10                      15

Val Arg Val His Val Ser Lys Glu Glu Gln Tyr Tyr Asp Tyr  
                     20                      25                      30

<210> 66  
 <211> 27  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetice

<400> 66  
 Tyr Asp Pro Asn Tyr Leu Arg Thr Asp Ser Asp Lys Asp Arg Phe Leu

00701623-120100

1 5 10 15

Gln Thr Met Val Lys Leu Phe Asn Arg Ile Lys  
20 25

<210> 67  
<211> 24  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 67  
Gly Ala Tyr Ala Arg Cys Pro Asn Gly Thr Arg Ala Leu Thr Val Ala  
1 5 10 15

Glu Leu Arg Gly Asn Ala Glu Leu  
20

<210> 68  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 68  
Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu Asp  
1 5 10 15

<210> 69  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 69  
Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro  
1 5 10 15

Asn Ala Pro Ile Leu



<210> 70  
 <211> 20  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 70  
 Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser Ala  
           1                  5                  10                  15  
 Leu Tyr Arg Glu  
                           20

<210> 71  
 <211> 20  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 71  
 Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu  
           1                  5                  10                  15  
 Met Thr Leu Ala  
                           20

<210> 72  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 72  
 Trp Val Arg Asp Ile Ile Asp Asp Phe Thr Asn Glu Ser Ser Gln Lys  
           1                  5                  10                  15  
 Thr

<210> 73  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 73  
Arg Ala Gly Arg Ala Ile Leu His Ile Pro Thr Arg Ile Arg Gln Gly  
1 5 10 15

Leu Glu Arg

<210> 74  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 74  
Ala Val Ala Glu Gly Thr Asp Arg Val Ile Glu Val Leu Gln Arg Ala  
1 5 10 15

Gly Arg Ala Ile Leu  
20

<210> 75  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 75  
Ala Leu Asn Ile Trp Asp Arg Phe Asp Val Phe Ser Thr Leu Gly Ala  
1 5 10 15

Thr Ser Gly Tyr Leu Lys Gly Asn Ser

<210> 76  
 <211> 22  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 76  
 Asp Ser Glu Thr Ala Asp Asn Leu Glu Lys Thr Val Ala Ala Leu Ser  
 1 5 10 15

Ile Leu Pro Gly His Gly  
 20

<210> 77  
 <211> 39  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 77  
 Glu Glu Ile Val Ala Gln Ser Ile Ala Leu Ser Ser Leu Met Val Ala  
 1 5 10 15

Gln Ala Ile Pro Leu Val Gly Glu Leu Val Asp Ile Gly Phe Ala Ala  
 20 25 30

Thr Asn Phe Val Glu Ser Cys  
 35

<210> 78  
 <211> 21  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic

<400> 78  
 Asp Ile Glu Lys Lys Ile Ala Lys Met Glu Lys Ala Ser Ser Val Phe

1 5 10 15

Asn Val Val Asn Ser  
20

<210> 79  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 79  
Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg  
1 5 10 15

Ile

<210> 80  
<211> 14  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 80  
Gly Leu Gln Gly Lys Ile Ala Asp Ala Val Lys Ala Lys Gly  
1 5 10

<210> 81  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 81  
Gly Leu Ala Ala Gly Leu Val Gly Met Ala Ala Asp Ala Met Val Glu  
1 5 10 15

Asp Val Asn

09701623 120100

<210> 82  
<211> 20  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 82  
Ser Thr Glu Thr Gly Asn Gln His His Tyr Gln Thr Arg Val Val Ser  
1 5 10 15

Asn Ala Asn Lys  
20

<210> 83  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 83  
Cys Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Cys  
1 5 10 15

<210> 84  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 84  
Cys Gly Glu Thr Tyr Lys Ser Thr Val Ser His Pro Asp Leu Pro Arg  
1 5 10 15

Glu Val Val Arg Ser Ile Ala Lys Cys  
20 25

<210> 85  
<211> 60  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<220>  
<221> MOD\_RES  
<222> (18)  
<223> S, T

<220>  
<221> MOD\_RES  
<222> (21)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (22)  
<223> G, T

<220>  
<221> MOD\_RES  
<222> (26)  
<223> H, T

<220>  
<221> MOD\_RES  
<222> (27)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (30)  
<223> G, T

<400> 85  
Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Ile Ser  
1 5 10 15  
Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa Ile Leu  
20 25 30  
Phe Gly Gly Cys Gly Gly Thr Tyr Gln Ser Arg Val Thr His Pro His  
35 40 45

Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
50 55 60

<210> 86  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 86  
Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg  
1 5 10 15

Ile

<210> 87  
<211> 62  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic

<400> 87  
Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg  
1 5 10 15

Ile Lys Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile  
20 25 30

Thr Thr Ile Asp Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His  
35 40 45

Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
50 55 60

<210> 88  
<211> 57  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 88

Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Lys Lys Lys Lys  
1 5 10 15

Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Tyr Ile Asp Lys  
20 25 30

Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro His Leu Pro Lys  
35 40 45

Asp Ile Val Arg Ser Ile Ala Lys Cys  
50 55

<210> 89

<211> 19

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 89

Ile Ser Leu Thr Glu Ile Arg Thr Val Ile Val Thr Arg Leu Glu Thr  
1 5 10 15

Val Leu Phe

<210> 90

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 90

Ile Ser Leu Thr Glu Ile Arg Thr Val Ile Val Thr Arg Leu Glu Thr  
1 5 10 15

Val Leu Phe Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro  
20 25 30

His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys



<210> 91

<211> 63

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic

<400> 91

Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg  
1 5 10 15

Ile Lys Ile Ser Leu Thr Glu Ile Arg Thr Val Ile Val Thr Arg Leu  
20 25 30

Glu Thr Val Leu Phe Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr  
35 40 45

His Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
50 55 60

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